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ABSTRACT

In an attempt to improve vocational education in Lincoln County, North Carolina, the Lincoln County School of Technology (LCST) was established by a partnership between a local foundation, the county Economic Development Commission, and the local community college, Gaston College. LCST is a magnet school, providing technical classes to local high school students, and is designed to teach generic competencies in industrial, health and human, and business and marketing technology. LCST's three-way partnership enabled it to provide students with up-to-date instructional equipment, including: (1) computer networks for electronic mail, office automation, and student management software; (2) CD-ROM, to store large amounts of multi-media information; (3) fax machines, to provide training in what forms of information should be sent via fax; (4) interactive laser video disk used in health occupations education, individualized math courses, and electronics courses; (5) information services such as CompuServe, Dialog, and Dow Jones providing otherwise unattainable information; (6) Optel, which allows remote locations to connect via telephone and computers; (7) studio and closed circuit television, including a satellite dish hook up, used for taping student presentations as well as participating in teleconferences; (8) the "TI-IN" network to deliver course material in subjects not warranting a full-time instructor; (9) Text on Microfiche, which reduces storage space for periodical literature; (10) programs for computer aided design, manufacturing, and number control; (11) scanning cash registers for business and marketing education; and (12) computer-based auto mechanics instruction. Diagrams providing descriptive information about the program are appended. (MAB)

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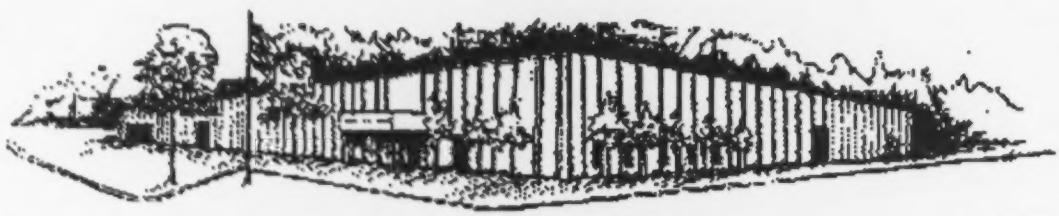
A School of the Future . . . Today



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1989 Governor's School of Excellence

JC930091

History of Innovation at LCST

The planning for the Lincoln County School of Technology (LCST) began in the late 1970s.

The planning continued with starts and stops through the changing of school superintendents and the catastrophe of a building fire. Finally in 1983, there was a concerted effort by the Superintendent to secure funding from private sources.

The Timken Foundation was approached about the possibility of funding and the Foundation informed the system that funding would be by way of competitive application. With this in formation in hand, a Vocational Improvement Program (VIP) committee comprised of 21 top executives of business and industry in the county was appointed. This committee was divided into several subcommittees which had specific roles in helping the school system secure the needed funding. Over the ensuing months of application and receipt of the grant and the planning and implementation of the program, the VIP committee members devoted themselves fully to the task.

While the VIP committee began working, a new partner began to emerge. Gaston College, the designated provider of community college services to Lincoln County, became a full partner in the endeavor to win Foundation funding. Gaston College was interested in how its satellite campus in Lincoln County could become a more vital part of the college's main campus. Prior to this project few students continued from the Lincoln Campus to the main campus. Most of the courses taken were terminal in nature — not leading to other courses. As the work progressed on the project, the involvement level of the college increased.

The Timken Foundation board decided to fund the Lincoln County request pending a quantitative study of all aspects of the request. The Foundation agreed to hire a consulting firm to conduct the audit. Several nationally known research groups were contacted and asked to submit proposals to do the study of vocational education and make recommendations about the curriculum. The Research Triangle Institute (RTI) of the Research Triangle Park, NC was the successful bidder for the project and began the research in 1985. Dr. Lamarr Cox headed the research team.

There were several salient findings in the RTI study:

- *~ current vocational education in the county is inadequate*
- *~ joint use planning is ideally suited to this location*
- *~ the curriculum should be based on a cluster concept and utilize three generic areas*

As the RTI study got underway, the State Department of Public Instruction in Raleigh, always supportive in the efforts to secure funding, expanded their efforts and assigned a staff person to the Lincoln County Project, as it was known.

As the RTI study was being conducted, a third partner emerged for the Lincoln County School of Technology. The Lincolnton-Lincoln County Economic Development Commission joined as a key player in the total community orientation of the project. The project was directed toward forming a school of technology designed to meet future needs.

Alternate delivery mechanisms for instruction were explored. The philosophical bases of education were examined and evaluated. The decision was made to change skills-specific courses to include generic competencies in three broad areas—Industrial Technology, Health and Human Technology, and Business and Marketing Technology.

Aside from the million dollar grant from the Timken Foundation, the school also received a special legislative appropriation of over $400 thousand, and grants from local business partners in excess of $230 thousand. With these grants, along with numerous smaller grants for special projects (qv $25,000 from special State Department/Division of Vocational Funds) the school was able to provide the technology which would propel it into future.

As specific equipment is discussed no one should assume that a single school system could have provided it. This facility is the result of a partnership—all entities brought resources and expertise to the endeavor.

LCST is a magnet school drawing students from the county's three other high schools. The students come to LCST to take only

a specific course, the rest of their classes are taught at the home schools. A student comes to LCST for a two hour block.

The format of the remainder of this paper will be to describe the piece of equipment, discuss the reason for having it, detail its current educational use, and look toward the future use. Regular computers will not be discussed except to say that currently there are 46 IBM/PS2, 12 additional IBM PCs and XTs, 7 Tandy 3000 HLs, 3 IBM and Tandy laptops, 15 Apple //e, 4 Apple //gs, 25 Macintoshes, and approximately 10 assorted machines from early TRS-80s to Zenith machines. Also not mentioned will be the hard drives, scanners, plotters, laser printers, dot matrix printers, daisy-wheel printers, modems, and other purely computer accessories.

NETWORKS

There are three interlocking networks at LCST. One of these networks is a minicomputer network based on the IBM system 36 (S/36), a second network is based at Gaston College's main campus and is based on the Prime computer, and the other is a Macintosh network. There are 26 terminals and printers attached to the IBM system. Two of the terminals are microcomputers which act as gateways for remote communications. One of the terminals is a modem link so that teachers can "call up" from home and access the central computer. This computer is using the AST-5250 Emulation Card which will support 4 simultaneous remote sessions. The other gateway is running the TOPS software and links the Macintosh network to the IBM system.

The reason for going with the S/36 was to gain access both to the administrative as well as productivity software. The student management software, TeamMate, runs only on the minicomputer.

We currently utilize the IBM network for electronic messaging, office automation products including word processing, calendering, personal services, and TeamMate since every teacher has access to a terminal in his/her office. The Macintosh network, which is based on Apple Share, is used primarily in the Business and Marketing Cluster for desktop publishing, layout, and computer assisted instruction. The call-up function on the IBM is utilized by several teachers and the principal to access the information from home and also for access from the other high schools in the county and from a remote teaching location. Student competencies are on the S/36 for each of the vocational courses offered by the state of North Carolina. Teachers can individualize instruction for a particular student or group of students.

The future use for the S/36 will be simply to install more high speed modems to make the remote locations better able to use the central computer; to enhance the use of the Team Mate database by adding teacher competencies (already identified by the state); and making the data base available to other teachers in the system. For the Macintosh network, future use will be to increase the network so that preparation of teaching materials, advertising brochures, and other informational pieces will become commonplace.

CD-ROM

CD-ROM is an information storage technology. It utilizes platters which look very much like the compact disks for music. Information is packed on the CD-ROM — up to 600 megabytes the equivalent of over 600 floppy disks!! CD-ROM technology at LCST is available for both the MS-DOS (IBM compatible) and for the Apple Macintosh machines.

This laser storage technology seems to offer a practical solution to the information explosion which is taking place in business and industry.

Students will need to be familiar with information retrieval in the 21st century and this technology seems most promising.

At LCST, the CD-ROM is utilized to research in Grollier's *Electronic Encyclopedia*, Compton's *MultiMedia Encyclopedia*, McGraw Hill's *Encyclopedia of Science and Technology*, Dialog's ERIC files, to get electronic clip art files, and other program files. New titles are constantly becoming available and are being added to the collection. The school is now subscribing to *Nautilus* which is a monthly magazine on CD-ROM.

The future use of CD-ROM will include increased distribution of information on this media.

Plans are underway to create a CD-ROM at LCST which will be used here and at the other schools in the system. More software will be distributed on this media and at LCST this will be utilized as soon as possible.

FAX

While FAX (facsimile) is nothing new to business, its use in schools is just beginning. At LCST we are utilizing two FAX machines which are used to train students in not just the how but also the why of use. Our machines are Xerox 7007, and have 50 number memory and thermal paper copies. They can also act as copiers In addition to their send/receive functions.

The primary reason that LCST has the FAX machines stems from the fact that a new business , Kawai America, located a plant in our county and used our building as office and training space for several months before their plant was completed. They were constantly receiving FAX documents from Japan and it became very obvious that this was indeed an important business tool.

The current use at LCST is in training and in determining what should be sent from a business standpoint. Students are also using the machine to send dedications, song requests, etc. to one of the teen-oriented radio stations.

Future use of this technology, will include linking the high schools and their business departments and main offices via a FAX network so that important information can be sent and received in an expeditious fashion. Business use will also expand at LCST and working with our other partners we will continue to look for ways to use technology in different ways.

INTERACTIVE LASER VIDEO DISK

Interactive laser video disk technology is utilized at LCST in several subject areas. The technology was developed originally to show high quality movies in the home. This trend failed to catch on when the video tape industry came on the scene with portable, high quality cameras and recorders. The video disk technology languished until someone decided that it was a perfect medium for information since each of the nearly 54,000 pictures can be accessed individually! This access made it a teaching machine of excellence. It could have live video portions with sound and motion and then have a freeze frame for further study. With computer control to give the medium interactivity, the video disk could assume a key role in the individualized learning process. At LCST the machines used are all Pioneer products. They are all hooked into MS-DOS computers.

The reason for interactive laser video grew out of the desire to provide individualized instruction at LCST. Currently the technology is being used in Health Occupations, individualized math through College Algebra, in electronics, and in an innovative technique developed by IBM called PALS (Principles of the Alphabet Literacy System) which uses not only laser video but also touch screen technology to improve reading skills.

What the future holds in the area of interactive laser video will depend on the ability of the soft ware producers to get meaningful courseware onto the disk. Currently there is a dearth of technically-orientated material aimed at high school students. Other areas are well covered and it should be only a matter of time until technical topics are covered adequately.

INFORMATION SERVICES

In a broad sense this area could be called telecommunications because the telephone is utilized to access remote data bases for information. The different data services which are used at LCST are CompuServe, Dialog, and Dow Jones. Each of these services provides students with information that either would be very difficult or impossible to obtain locally.

Calling one of the information services allows the student to learn how information is stored and have the same access as a person in New York, Los Angeles, or Podunk. It seems increasingly clear at LCST that it is not what one knows but what one can find out that will be increasingly important in the business world.

Each of the services are called and students learn how to get information and more importantly how to utilize that information. The goal this year will be to have each student at LCST to use one of the services at least once. Information services are proliferating rapidly and one goal at LCST is teach what should be looked at in deciding which one to use.

OPTEL

Optel is a technology which allows remote locations to connect via telephone and computers. Once connection is made the sites can utilize an electronic graphics tablet to write on the video display. The writing appears at all locations connected. There is the ability for total interactivity among sites. Pictures can be sent along the regular telephone lines and received at the remote locations.

Current use for this technology is just beginning at LCST, eventhough in the eastern part of North Carolina this technology is being used to teach Principles of Technology and Applied Math classes. Plans at LCST are to use this information to teach classes at the local high school without having to bring the students into the central site. This might be done with the Principles of Technology classes here.

We have connected to one of the elementary schools, Catawba Springs, to teach a class on science and technology to fifth graders.

STUDI0 & CLOSED CIRCUIT TV

In the studio there are 6 cameras which can be used to capture the action. The control room has the ability to do editing—both audio and video The studio is utilized for a lot of visual activities. Students are taped to show them how they appear as they do presentations. Because of the differing times when students come, the studio videotapes the candidate speeches for the student clubs.

The studio also receives downlinks from a roof-mounted satellite dish. LCST has been the receive site for a number of teleconferences and has originated one conference here during the summer 1989. The local cable company provides the school with a connection for receiving high quality PBS and other programming signal.

From the control room there are three channels delivered to each teaching space in the building. With this closed circuit capability it is possible to present information simultaneously to each student and teacher.

Plans for the future call for a greater utilization of the facility in student produced materials emphasizing communications skills. The production part of the studio is currently under-utilized and plans call for more use in this area. The hope is to connect with the cable company and provide programming for the public access channel.

This programming could be used by other schools and the general public as well.

TI-IN

The TI-IN network is sponsored by the NC Department of Public Instruction. It is a methodology for receiving information from Raleigh in a staff development mode. In addition it is useful for delivery of course material in subjects where there is too small number of students desiring — the course to justify a full time instructor.

LCST was selected as the single receive site in Lincoln County because of the ability to tape delay and the other technology available in the studio where TI-IN is housed.

Future use of this technology will depend on the funding level from the state and the programs they produce. It use will also depend on the number of students who desire specialized courses not offered in the county's high schools.

Text on Microfiche (TOM)

TOM is a research tool that is simply a guide to periodical literature and the complete text of a number of the citations. All students have looked through the Reader's Guide to Periodical Literature and know that they have to look through a number of volumes to find what they are looking for. The TOM approach is to provide monthly updates which cover the previous 5 years of citations. With this information, a student can then pull a microfiche and either read or print the information desired. A key reason for using this material in this manner is the savings in storage space required for a 5 year supply of magazines.

Currently students use the information in courses taken at LCST as well as an increasing number who are doing research in their English and social studies classes at the home schools.

Future use would be to provide another reader printer and perhaps to subscribe to the service on CD-ROM. The CD-ROM cost now is rather high but would have the advantage of computer based searching.

CAD/CAM/CNC

These three acronyms refer to computer aided drafting, manufacturing, numeric control. They are very valuable in the design and manufacturing processes in drafting and metals and machining. Currently three different CAD programs are used - AutoCad, VersaCad, and Generic Cad.

Students design and produce various objects using the processes in CAD/CAM/CNC. The students going through the program have a head start on college courses or in the job market with these skills.

Future expansion in this area will be to in crease the number of work stations using the software. There is a desire to expand the processes into other courses such as auto mechanics, electronics, and child care (design of centers).

Other Classroom Uses of Technology

There are a number of additional uses of technology at LCST which are probably common enough to most to only briefly mention them in the single paragraph summary.

Flat-bed Scanner- this is utilized to prepare digitized images which can then be used for illustrations in desktop publishing applications. The scanner can also be used to scan typed or printed material and thus prevent having to retype passages.

CAI- computer aided instruction is a key part of instruction here at LCST and is especially active in the areas of auto mechanics, wood technology , and in remedial math and reading.

OCR Grading- optical mark grading is utilized by teachers to speed the evaluation of student performance. All staff utilize this function.

Electronic Message center- this utilizes an Apple //e computer and Beagle Brother software to provide an ever changing display on monitors throughout the building.

Scanning cash register- this technology is used to read bar codes and to train business and marketing students in the use of this common technology in the business world.

MegaTech-this set of high-tech auto mechanics, computer-based learning modules is proving to be a valuable addition to auto mechanics instruction .

Electronic Bulletin Board- this is an electronic board which provides downloading and messaging capabilities for all those in the county without having to make a toll call to access the board.

While no technology can teach any student, the utilization of technology makes it easier for the Lincoln County School of Technology to fulfil its mission:

LINKING CAREERS SCHOOLS AND TECHNOLOGY

School of Technology

Partners

Economic Development

Gaston College

Lincoln County Schools

School of Technology

Background

School of Technology

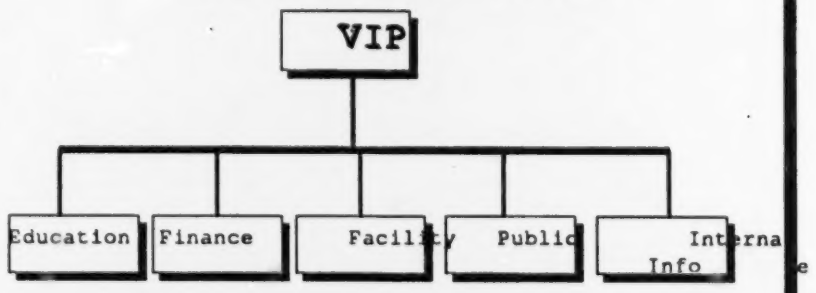
Studies for LCST

John Bishop
done by LEA to provide a basic vocational education study. Called for centralized vocational offerings.

Research Triangle Institute
done at request of Timken Foundation. Laid current foundations of the School of Technology.

School of Technology

VIP Committee



School of Technology

Research Triangle Institute Findings

1. Current vocational program is inadequate.
2. Continue planning for integration between Gaston College & Lincoln County Schools.
3. Provide classes at a central site in A.M. and P. M.
4. Continue introductory vocational courses at the home schools.
5. Base curiculum on the Cluster Concept.
6. Augment class with work study.
7. Teach vocational competencies in all classes.
8. Continue VIP committee as oversight group.

School of Technology

Concept

School of Technology

Funding for LCST

Regular LEA Funding

Regular Vocational **Funding**

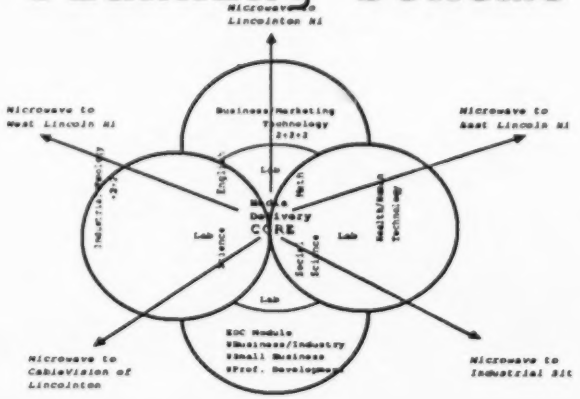
Special grants :

LCST Business Partners gifts of $15,000
Business grants of < $15,000
Individual grants
Special legislative funding of $442,000

Gaston College Operating Funds

School of Technology

Planning Scheme



School of Technology

Time Schedule
1987-1989

Morning Students
- Car driving arrive 8:00 a.m. & 9:40 a.m
- Bus riding arrive 8:15, 8:30 & 9:00 a.m

all students stay for 110 minutes

Afternoon Students
- Bus riding arrive 12:30 p.m.
- Car driving arrive 1:00 p.m. & 1:10 p.m

Times vary according to home school schedule

School of Technology

Time Schedule
1989-90

Early Morning students (all 12 and all car):
- All arrive at 8:00 a.m. depart at 9:50 a.m.

Mid-Morning Students (mix 11 & 12; car & bus)
- All arrive 10:35 depart at 12:25 (ideal)

Afternoon Students (all 11 and all car)
- All arrive at 1:10 and depart at 3:00

School of Technology

Relationships with Home Schools

¥ Students*belong* to the home school they only take a class at LCST.

¥ All grades, pictures, rings, etc are at the home school.

¥ LCST tries to provide all services that home schools need--early dismissals to pep rallies, for athletic teams, and picture taking; technical expertise in any of the skill areas-electronics, carpentry, etc.

* During 1989-90 there are 14 students taking English at LCST to minimize travel

School of Technology

Teaching Methods

¥ Individualized

¥ Modularized

¥ Student-paced learning

¥ Generic in cluster areas

¥ Competency based

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Curriculum

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Course Offerings

Business/Marketing Technology Cluster

Health/Human Technology Cluster

Industrial Technology Cluster

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Actual Courses

Administrative Office II
Computerized Accounting II
Marketing & Merchandising I, II
Health Occupations I, II
Child Care Services I, II
Drafting I, II
Electronics I, II
Carpentry I, II
Furniture & Cabinetmaking I, II
Auto Mechanics I, II
Metals I,II

'School of Technology

How to Evaluate ?

CMDS providing us with a program called TeamMate which tracks individualized competencies, monitors student resource use, provides diagnostic/ prescriptive planning;complete administrative and curricular package.

VoCATS designed by SDPI to allow testing of individual competencies. This system will allow *report card* to be prepared for a student upon graduation which will show what the student is capable of doing.

School of Technology

Gaston College

- Metals (Cooperative Agreement)
- PALS lab
- Telecommunication
- Resources
- Enhanced opportunities

School of Technology

EDC

(Economic Development Commission)

- High visibility in business community
- Community support
- Advice & Information
- Funding assistance

School of Technology

Beyond Voc-Ed

PAGE- working to help these students. Research projects enrichment activities

Humanities Honors- academic TOP 20 from each home school

School of Technology

Accountability

Identified by RTI

- 1/3 of students to work force
- 1/3 of students to community college training
- 1/3 of students to 4-year college/university

Through 2 years we are on target with the RTI identified goals.

School of Technology

The Future

School of Technology

Awards & Recognitions

- Governor's School of Excellence Award
- Student winners in regional, state, and national competitions
- Student officers at regional and state levels

'School of Technology

Innovations

- Research-based curriculum
- Teleconferencing
- K-8 Resource - OPTEL"
- Fiber optics

'School of Technology

Today & Tomorrow

- Private funding for original project
  - Timken Foundation grant
  - Auto mechanics from Advisory Comm.
- Partnerships
  - enhanced Tech-Prep curriculum
  - enhanced work with Exceptional Children
- Learning with and about technology

School of Technology

Learning with and about Technology

- CD-ROM
- Laser video
- FAX modem
- Electronic bulletin board
- Networks
- Minicomputers
- Fiber optics
- Production TV

" Nothing prepared me for what I saw. Truly a school of the future" Dr. Angelo Collins, Asst Professor of Education, Rutgers Univ.